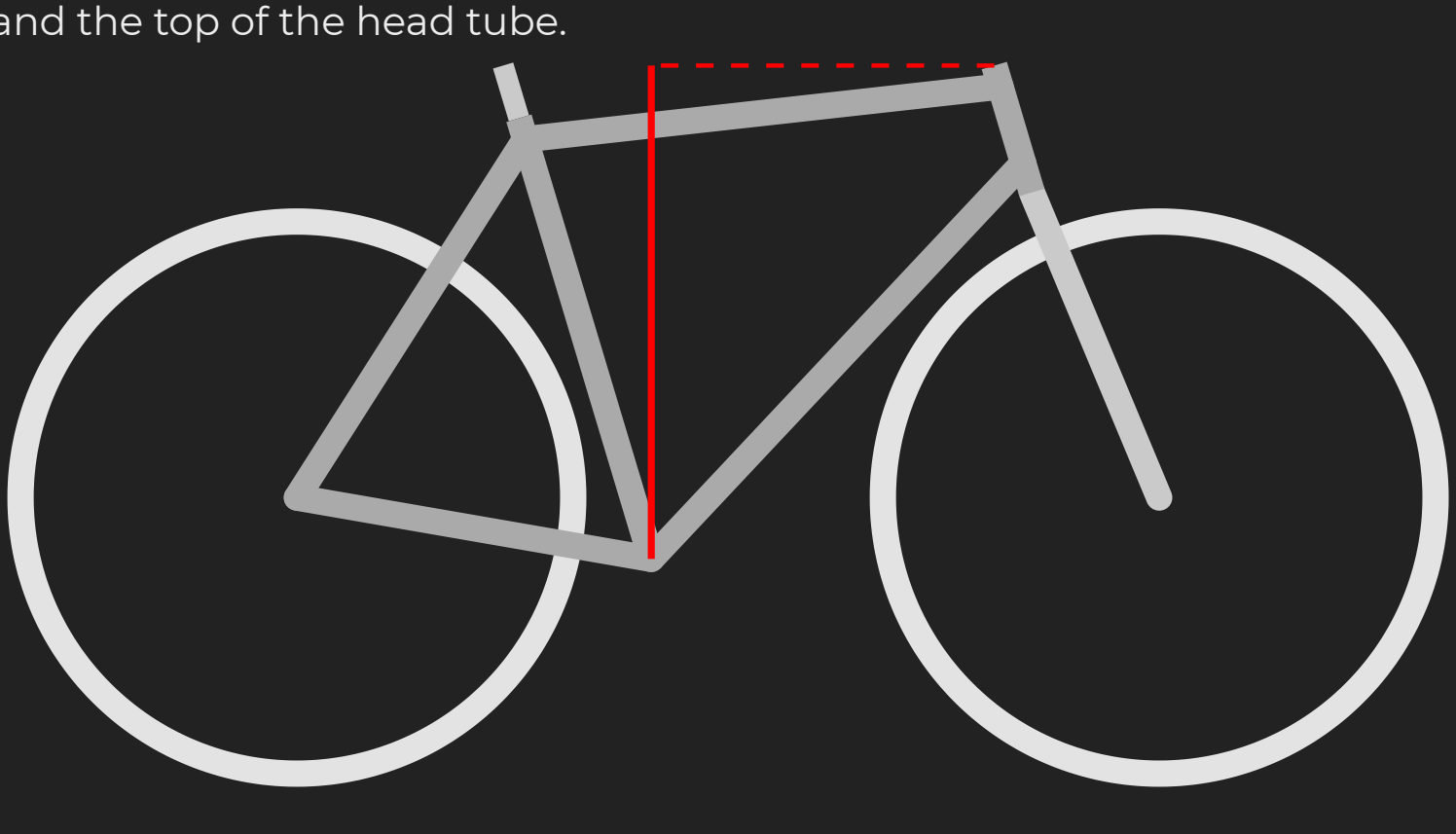
Black Lives Matter. Support the Equal Justice Initiative

Bicycle Geometry Terms

Stack

Stack is the vertical distance between the center of the bottom bracket and the top of the head tube.



Stack gives an indication of how tall or upright a frame's cockpit is. Bikes with a higher stack will allow you sit more upright, while bikes with a lower stack will keep you in a forward-leaning position.

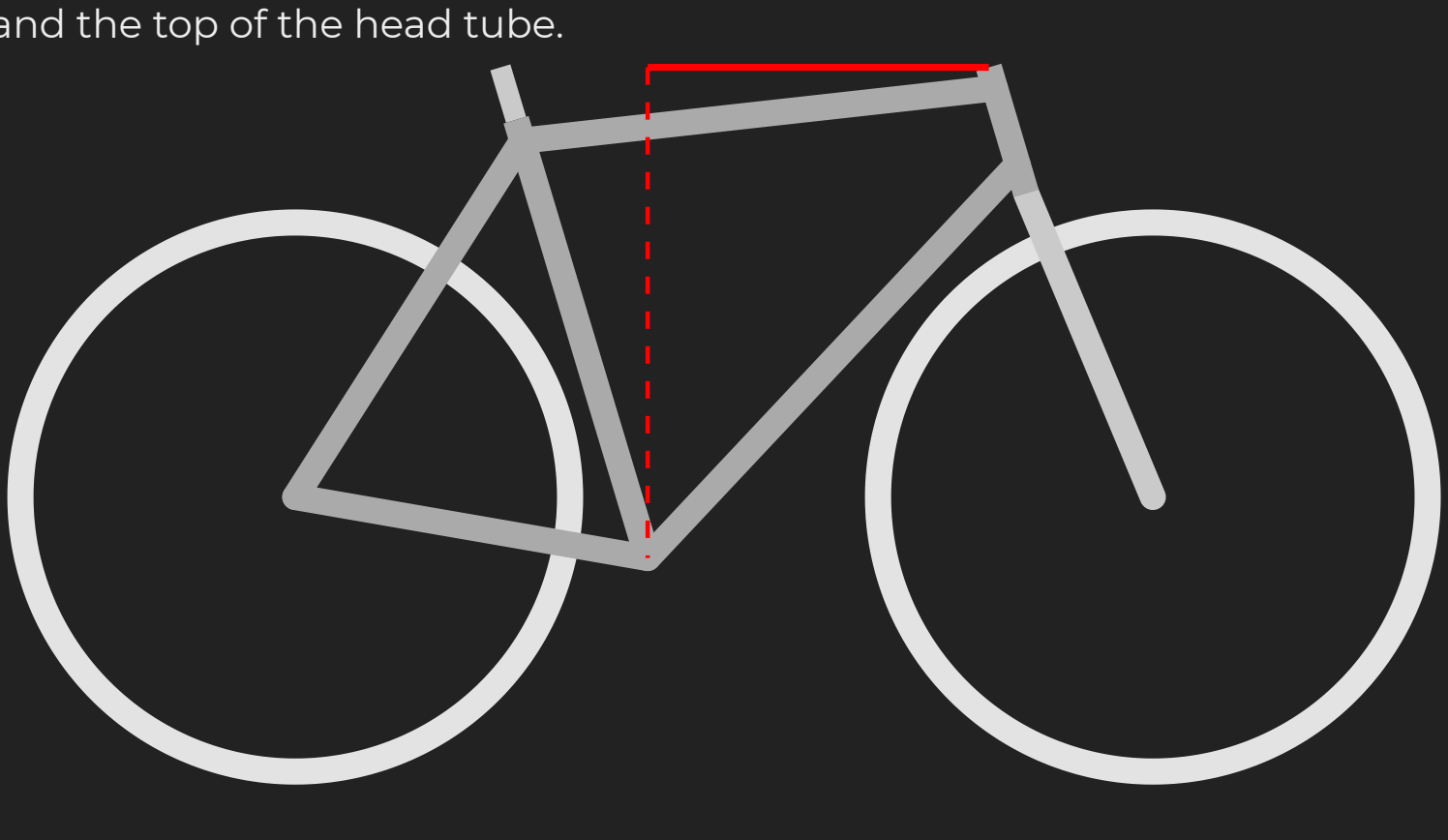
For example, endurance road bikes will typically have larger stack (keeping you in a more comfortable upright position for longer rides) than more race-specific road bikes (which keep you forward-leaning in a more aerodynamic position).

Primarily affects: Rider position

Related measurements: Reach—together, stack and reach are the most important measurements in determining if a frame will fit you.

Reach

Reach is the horizontal distance between the center of the bottom bracket and the top of the head tube.



Reach gives an indication of the length of your bike's cockpit. Bikes with a higher reach will stretch you forward on the bike, while bikes with lower reach will keep your weight farther back. Too long of a reach and you'll be stuck leaned over and stretched out, too short and you'll be in a position that's overly upright, decreasing balance.

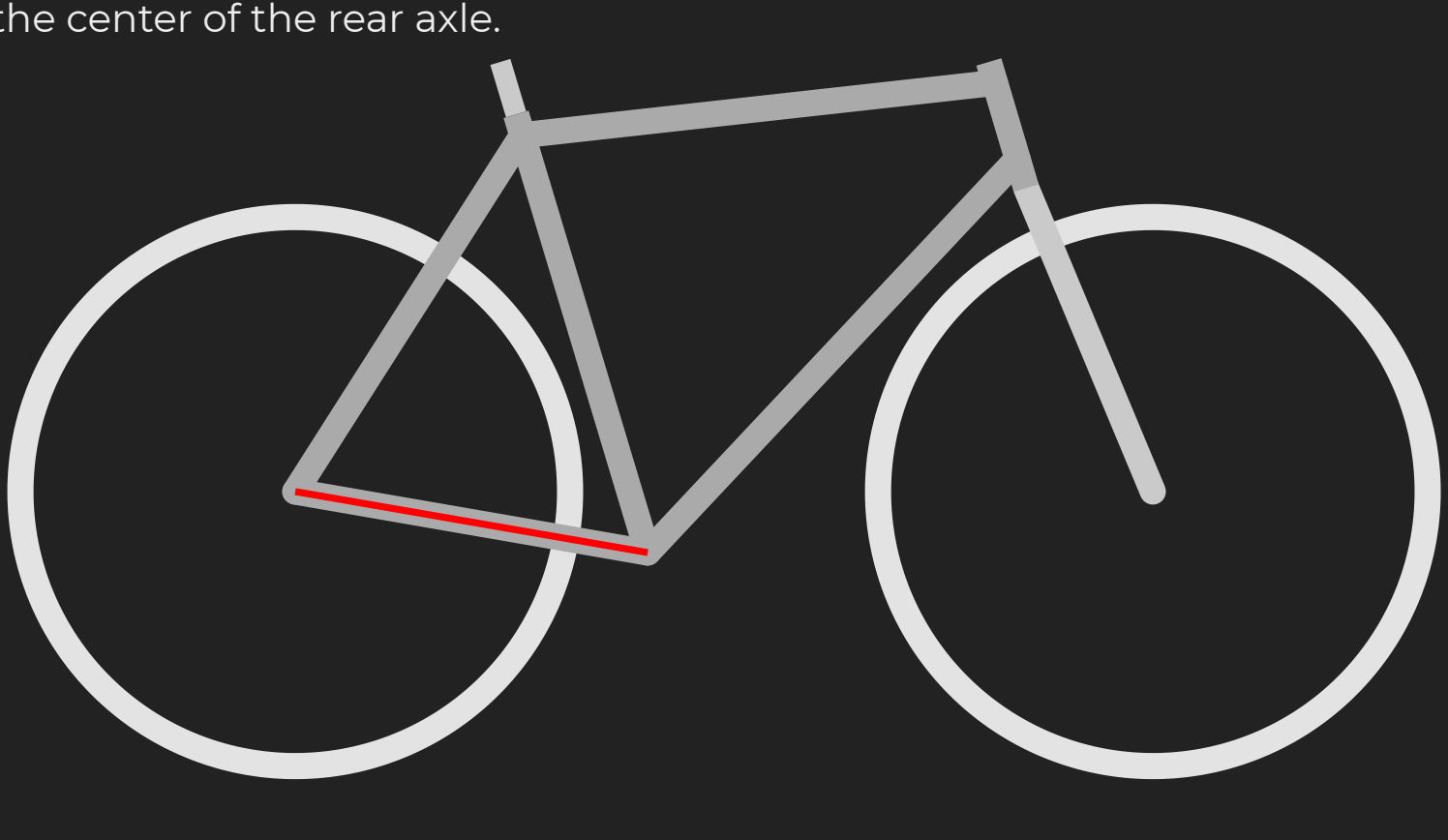
Primarily affects: Rider position

Related measurements: Stack—together, stack and reach are the most important measurements in determining if a frame will fit you.

Chainstay Length

Sometimes called: Rear Center

Chainstay Length is the distance from the center of the bottom bracket to the center of the rear axle.



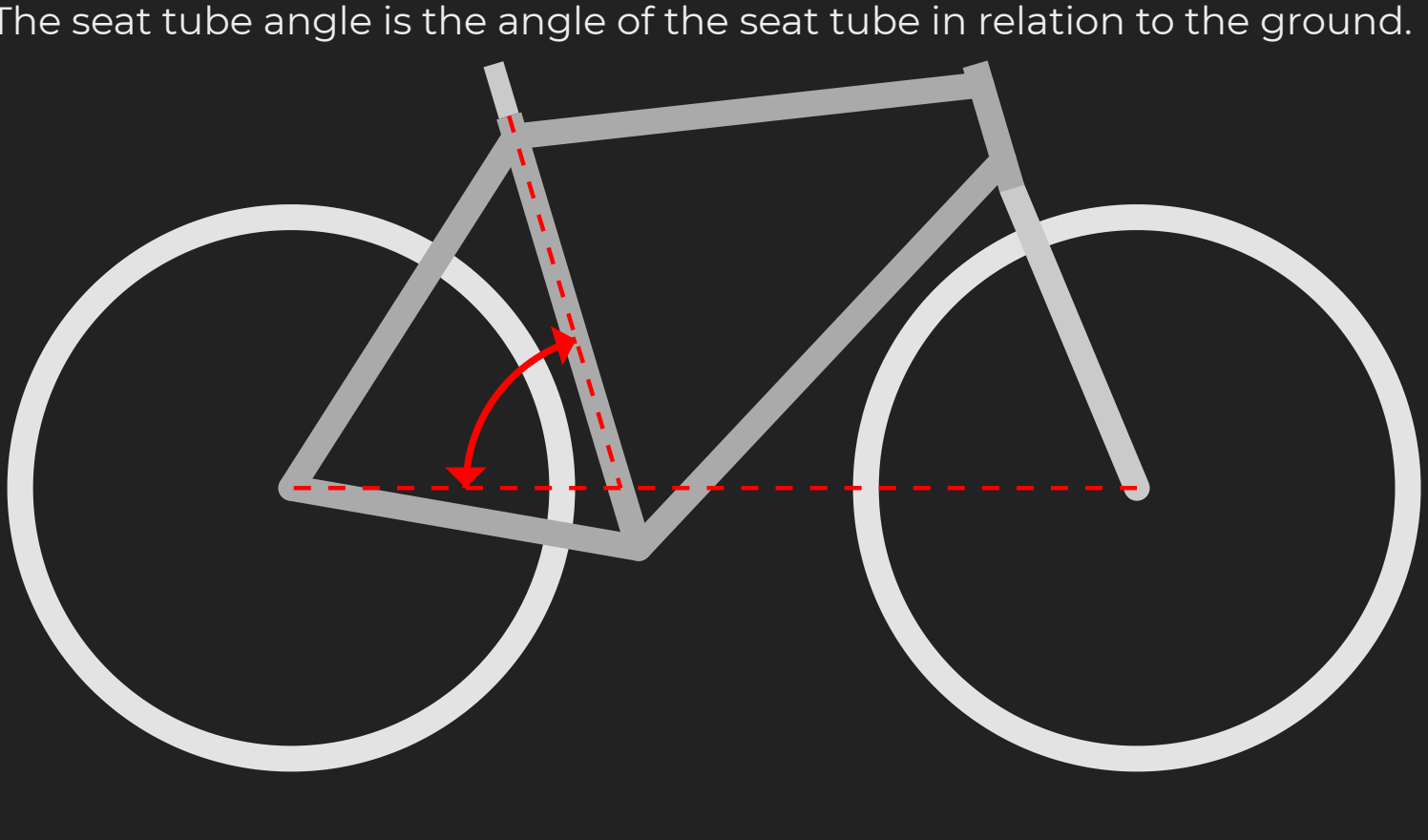
This measurement effectively determines the distance between the rider's center of mass and the rear axle. Bikes with short chainstays have the rear wheel closer to being under the rider. Short chainstays allow the rider to be more dynamic with their weight. This means easier manuals & wheelies and a general ease of getting the front wheel off the ground. This comes at the expense of overall Wheelbase length, which contributes to stability at speed and over rough terrain. (Consider that unintentional wheelies while going uphill aren't generally a desired trait.) If you want your bike to ride nimbly and like wheelies & manuals, short chainstays are your friend. If you prefer stability, go for a bike with longer chainstays.

Primarily affects: Rider's center-of-gravity on the bike

Related measurements: Wheelbase—chainstay length contributes to the overall wheelbase of the bike, which affects bike stability and cornering characteristics.

Seat Tube Angle

The seat tube angle is the angle of the seat tube in relation to the ground.



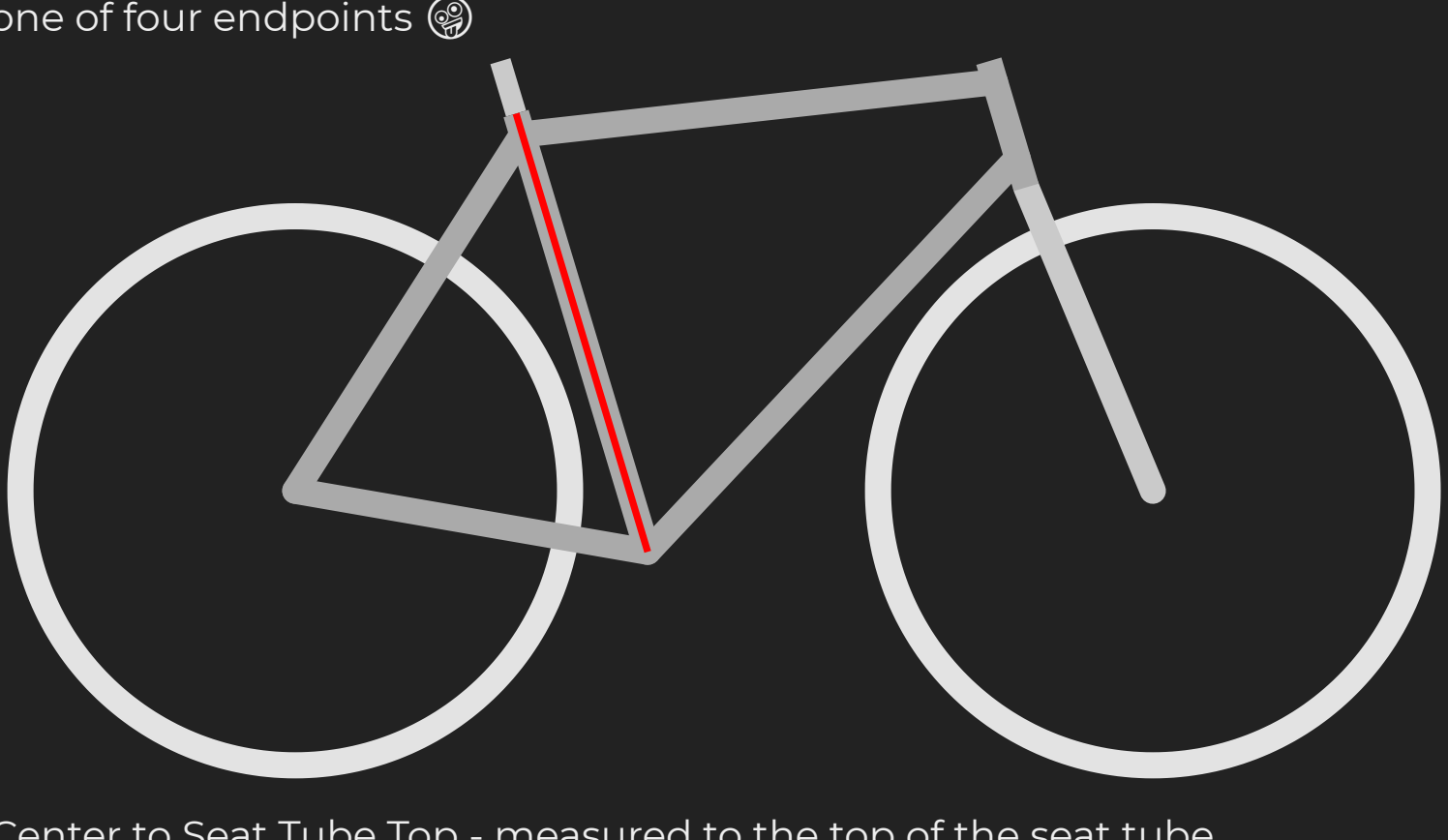
Seat tube angles range from about 70-77 degrees. A steeper angle moves the saddle forward while a shallower angle moves it back. Steep seat tube angles are typical in road race or triathlon bikes, when a rider wants to stay powerful while riding in a more crouched over and aerodynamic position.

You can adjust the effective seat tube angle by sliding your saddle forward or back in your seatpost rails.

Primarily affects: Rider position

Seat Tube Length

Seat tube length is measured from the center of the bottom bracket to one of four endpoints 😵



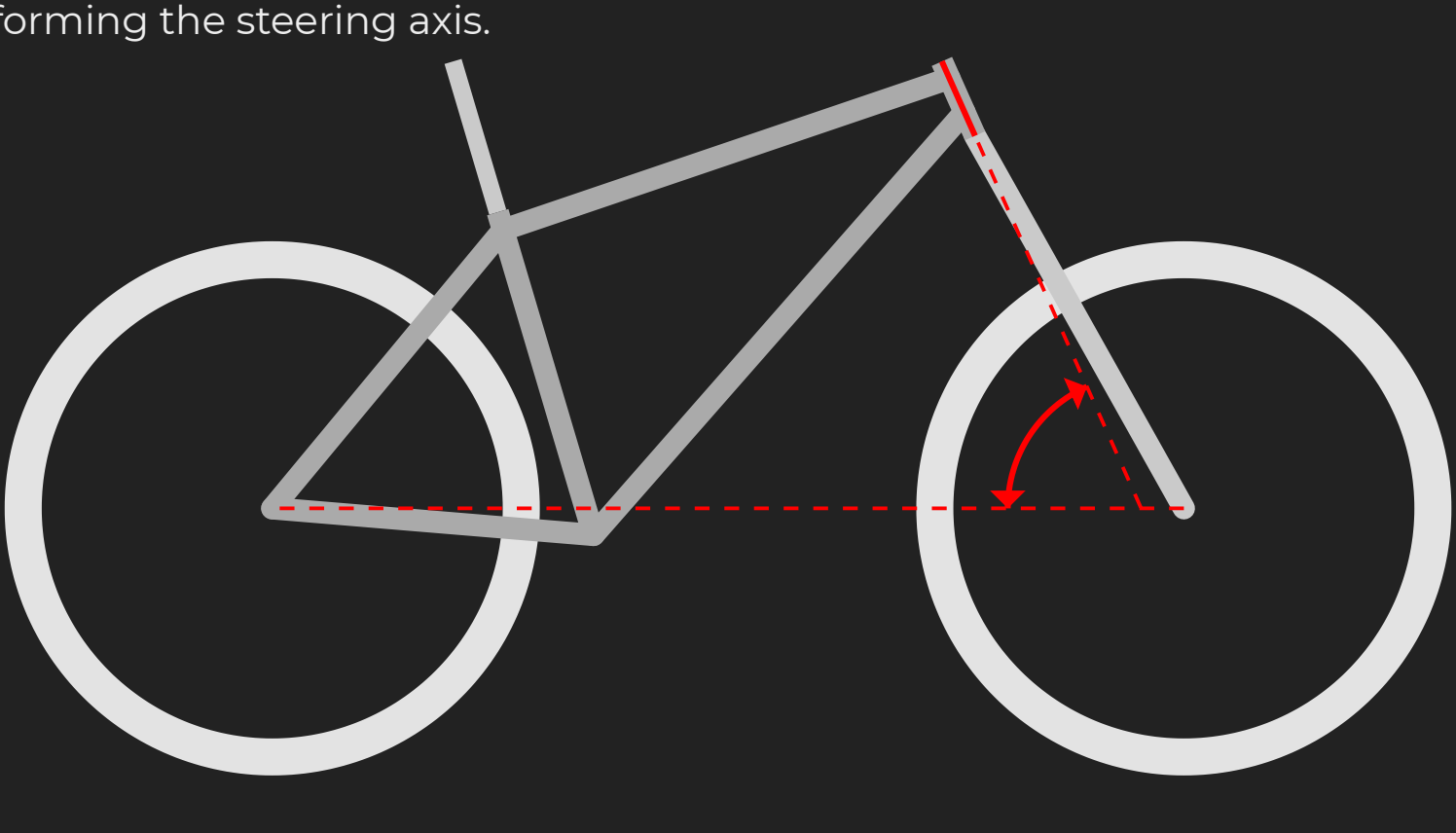
Center to Seat Tube Top - measured to the top of the seat tube.
Center to Top - measured to the top of the top tube / seat tube intersection.
Center to Center - measured to the center of the top tube / seat tube intersection.
Effective - measured to the intersection of an imaginary horizontal top tube extending from the top of the head tube.

Seat tube length on its own doesn't impact the fit of a bike. This value is used for calculating Standover height and determining how long your seatpost needs to be.

Primarily affects: Standover height and seatpost length

Head Tube Angle

The head tube angle is the angle of the head tube in relation to the ground. The head tube is the point on the bike that the fork mounts to, forming the steering axis.



Steep head tube angles provide quick and responsive steering but are less stable at high speeds.

Downhill mountain bikes are on one end of the spectrum with **slack** angles starting at ~62°. A slacker head tube angle will project the fork forward, positioning the front wheel out in front of the rider. This provides greater stability at speed (great for riding downhill fast) but can feel floppy and unresponsive at slow speeds (not great for climbing technical singletrack).

Road bikes are on the other end of the spectrum with **steep** angles up to ~74°. A steeper head tube will project the fork downward under the front of the bike, keeping the front wheel closer to the rider. This provides quick and responsive steering but can feel unstable and twitchy at high speeds, particularly on rough terrain.

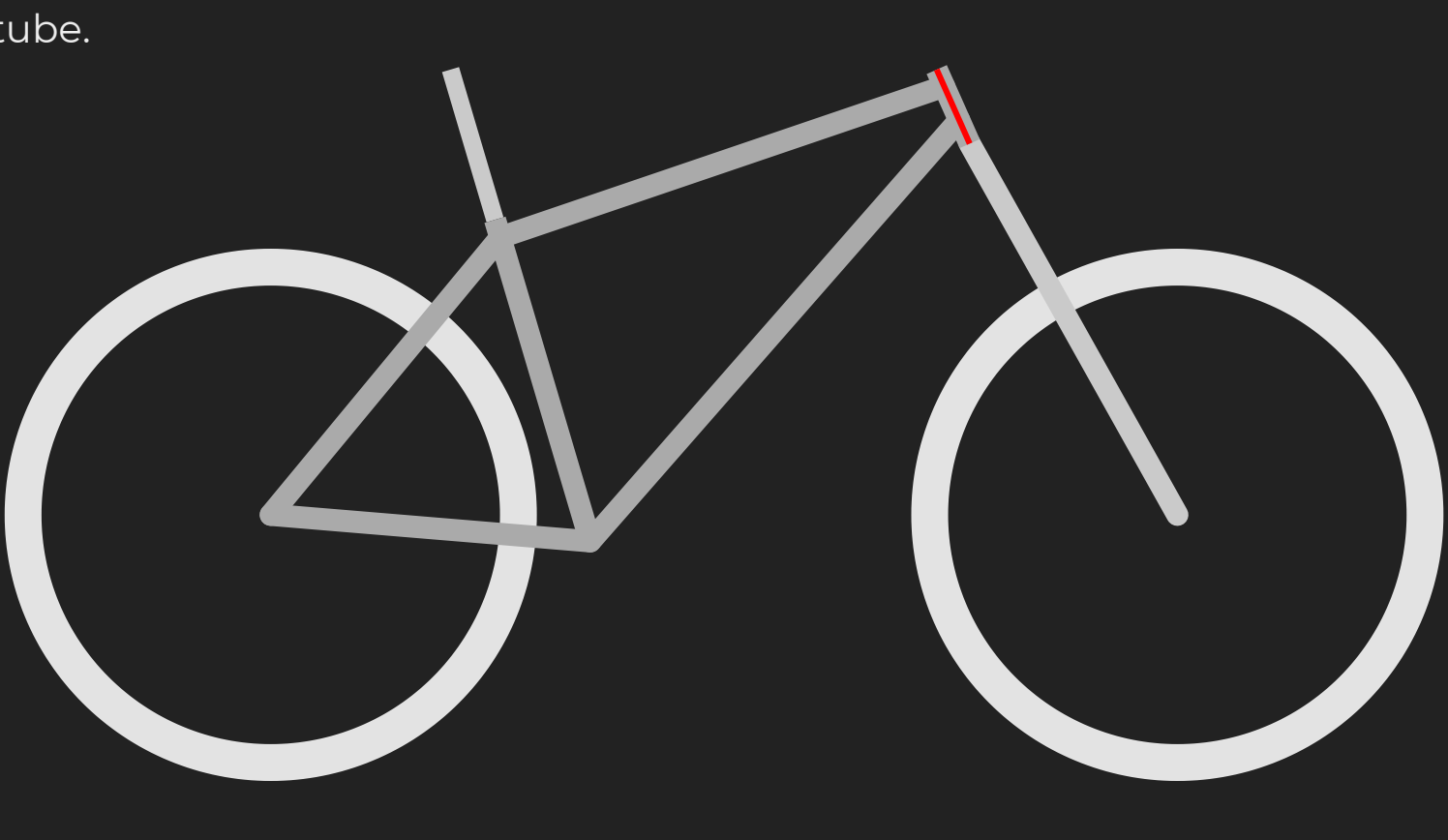
Cross country mountain bikes typically lie somewhere in the middle, around 67-70°. These bikes use head tube angles steep enough to effectively climb technical singletrack at low speeds and slack enough that you don't fly over the bars on the way down.

Caveat: Wheel size influences head tube angle. The larger the wheels the more leverage required for steering. In other words, 29er mountain bikes will generally have slightly steeper head tube angles than their 650b counterparts. Keep this in mind when comparing bikes of different wheel sizes.

Primarily affects: Steering

Head Tube Length

Head tube length is measured from the bottom to the top of the head tube.

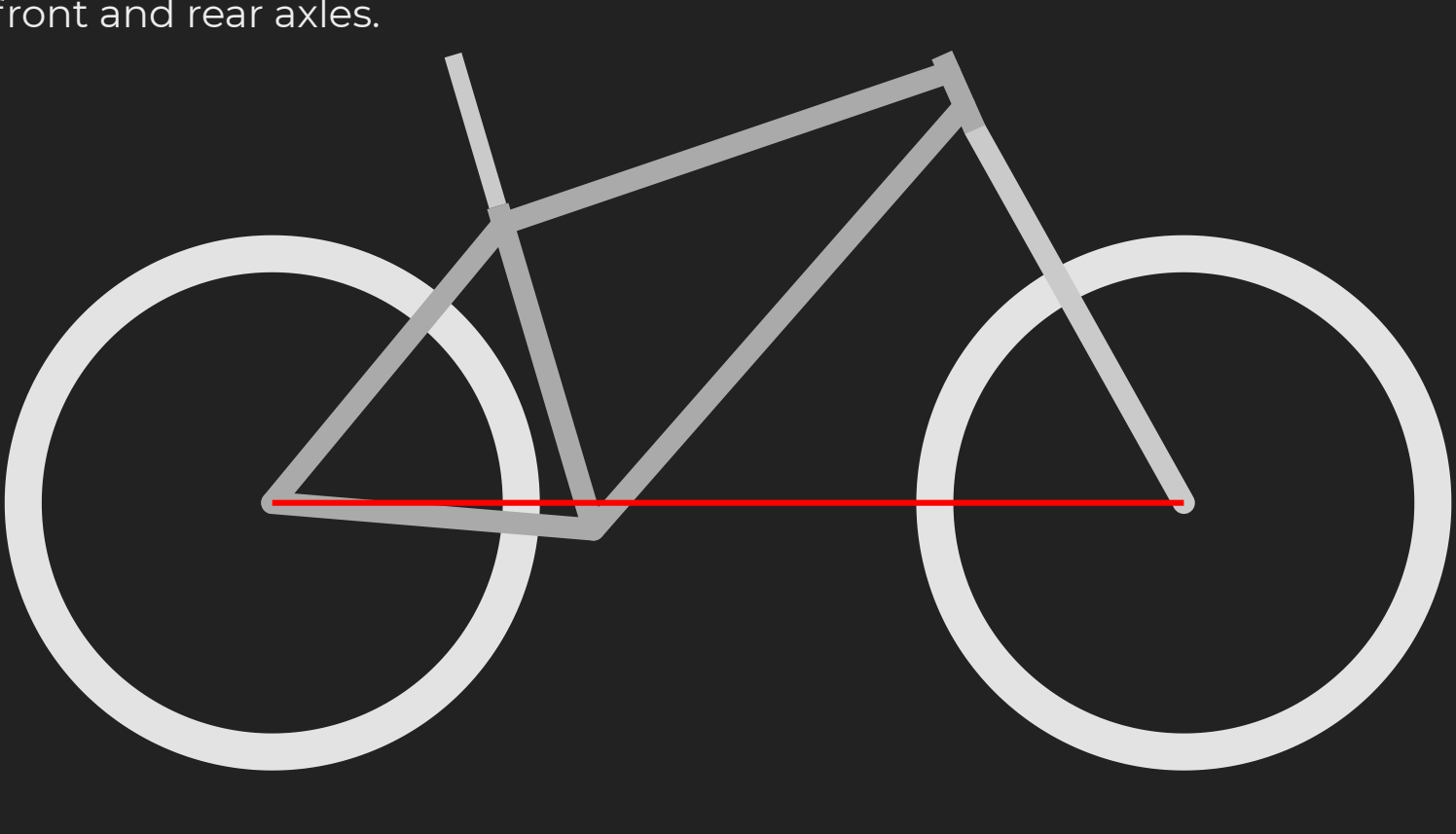


The length of the head tube will raise and lower a rider's position on the bike, but Stack is a better measure for this.

Related measurements: Stack

Wheelbase

Wheelbase measures the horizontal distance between the center of the front and rear axles.

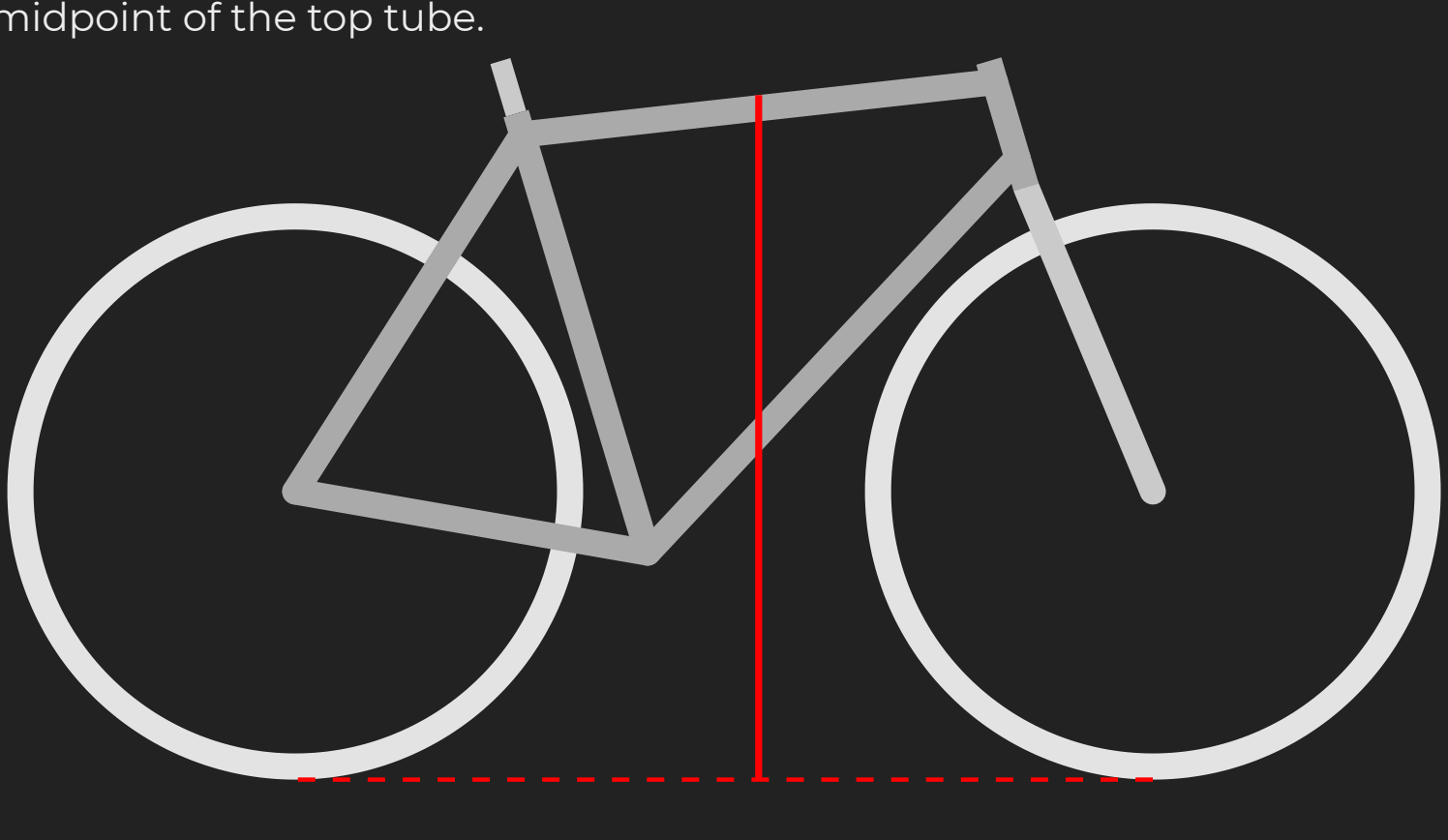


Bikes with short wheelbases are quicker handling, while bikes with longer are more stable and slower handling.

Primarily affects: Cornering

Standover Height

Standover height is a vertical line measured from the ground to the midpoint of the top tube.

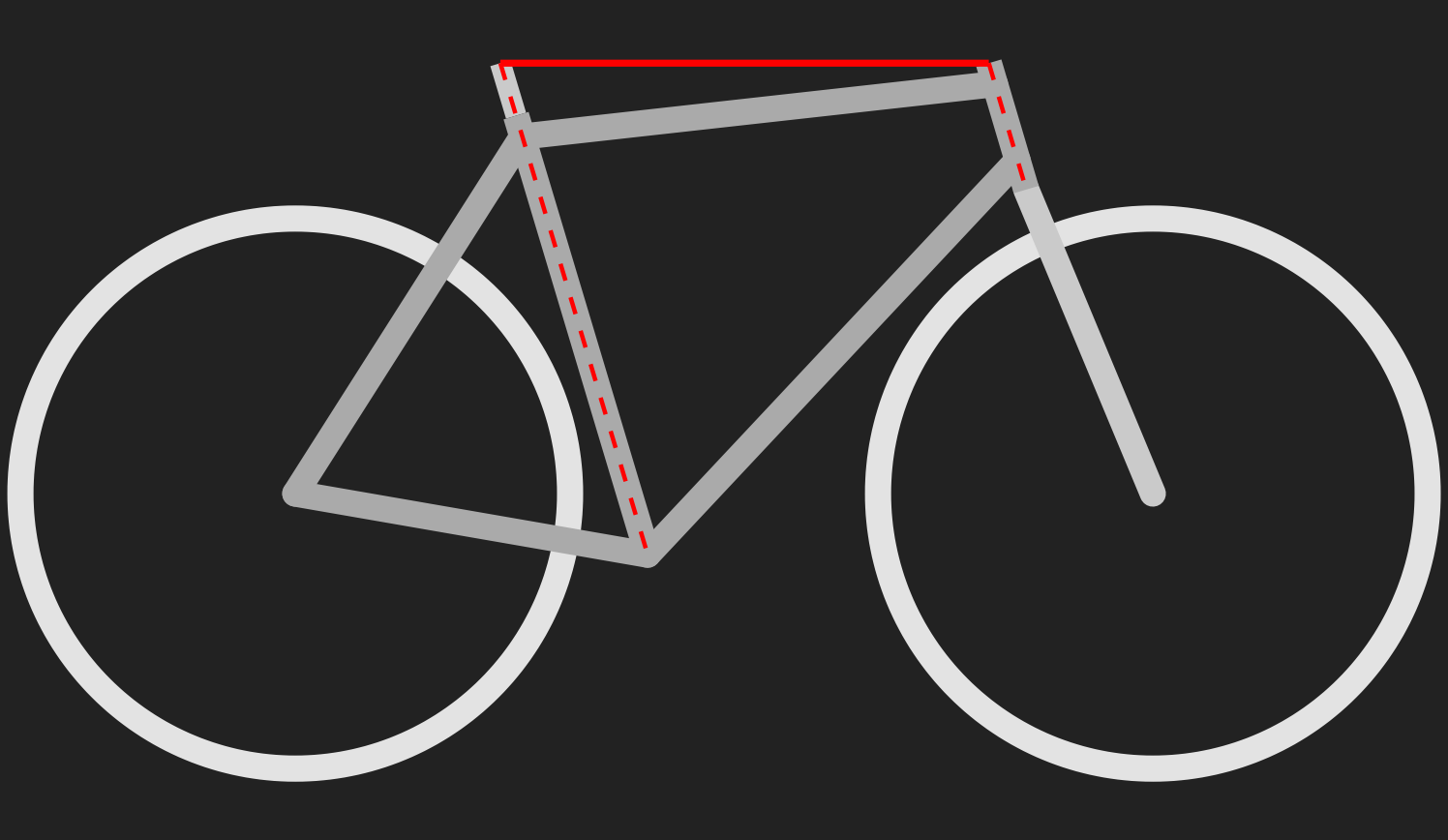


This is where you would be straddling the bike frame while stopped. You should have at least one inch of clearance between the top tube and the base of your torso. This will enable you to ride (and come to an abrupt stop) safely.

Top Tube Length

Sometimes called: Effective Top Tube Length

Top tube length measures an imaginary line from the center point of the top/head tube junction to the center of the intersection with the seat tube.



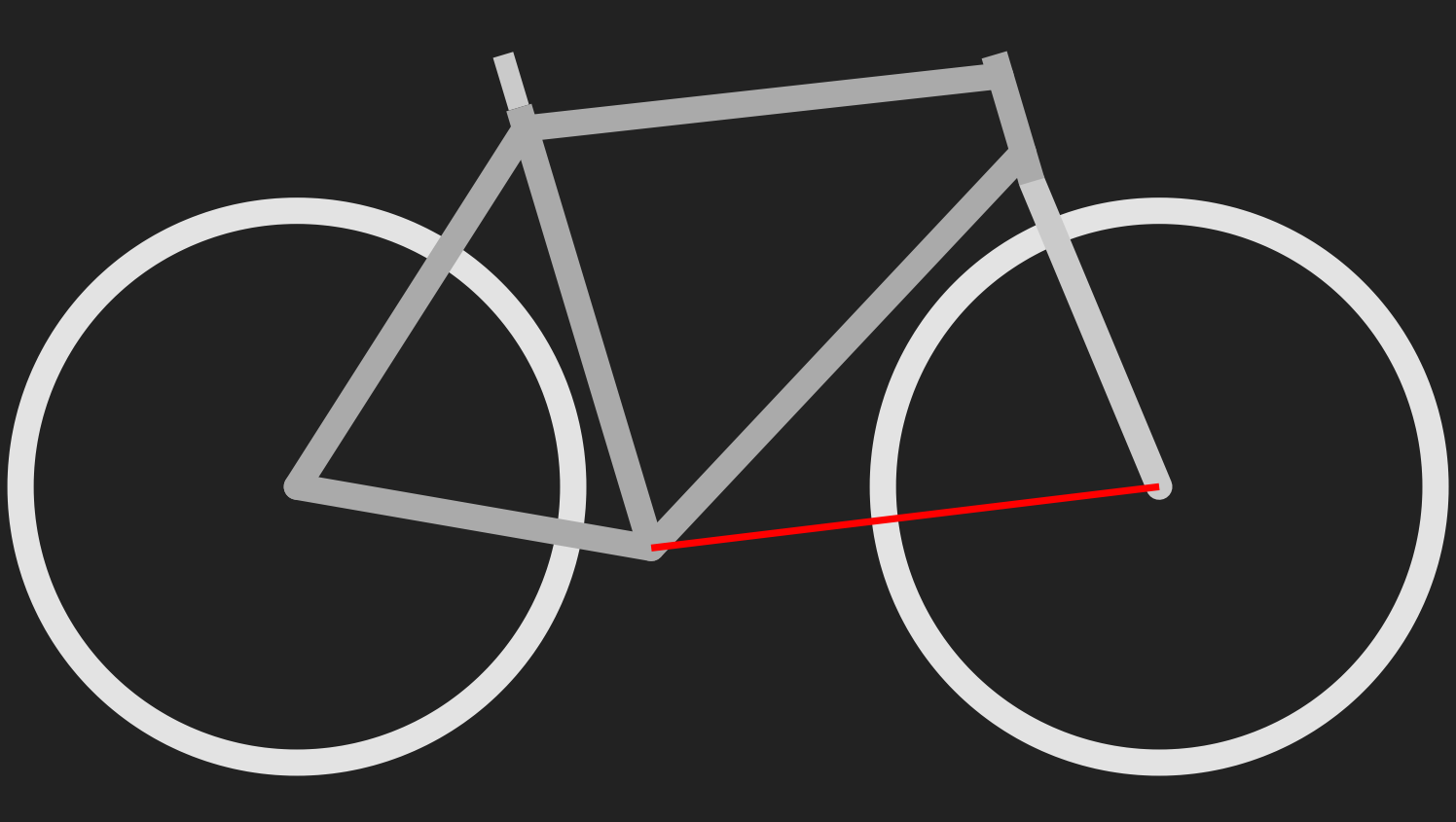
A longer top tube means you'll be more stretched out. Stack and

Reach are more reliable measures for determining frame geometry fit.

Primarily affects: Rider position

Related measurements: Stack, Reach

Front Center

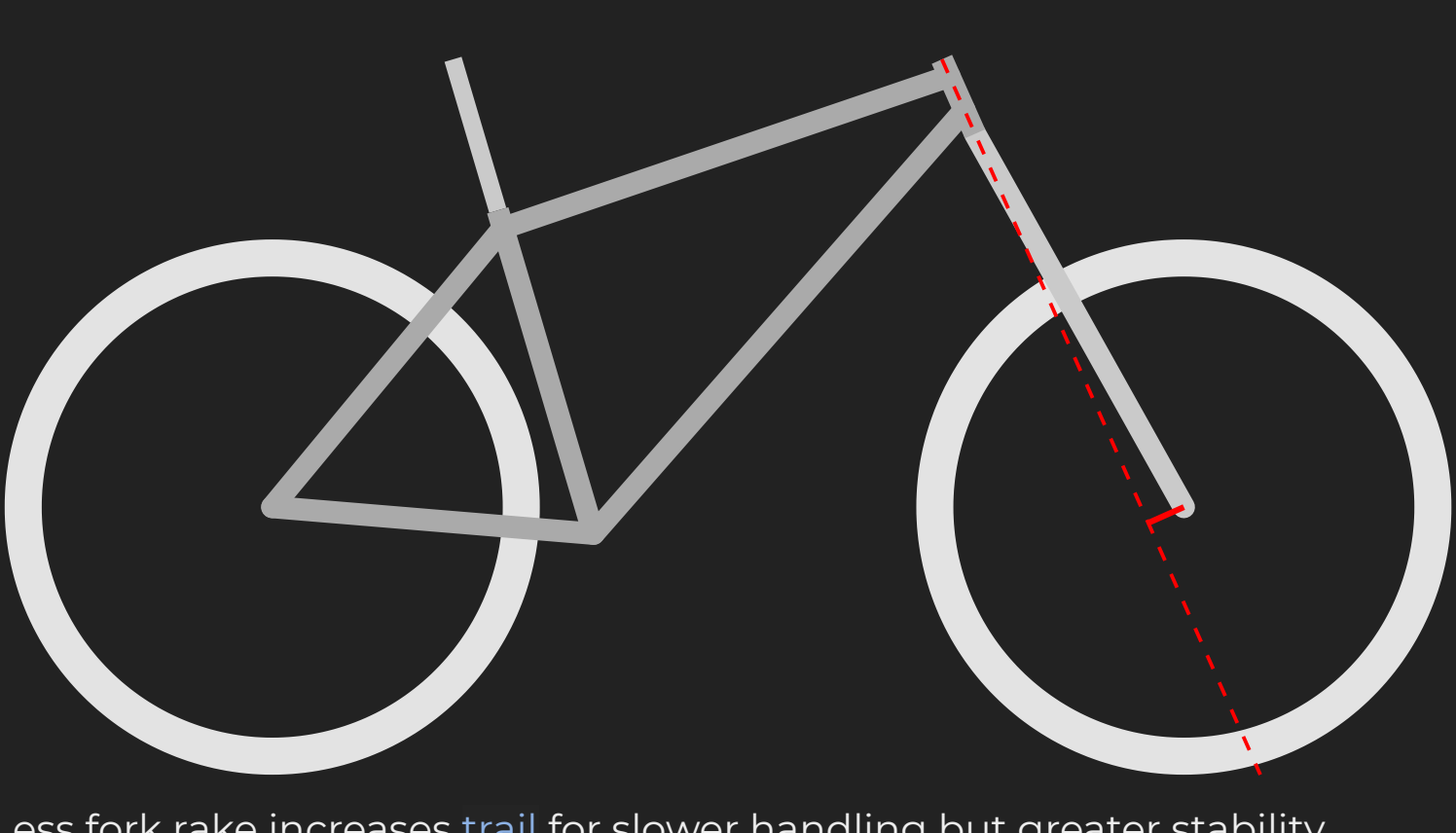


Measured from the center of bottom bracket to the center of the front axle.

Fork Rake

Sometimes called: Fork Offset

Fork rake is the horizontal distance from the projected steering axis (determined by the head tube angle) to the front axle.



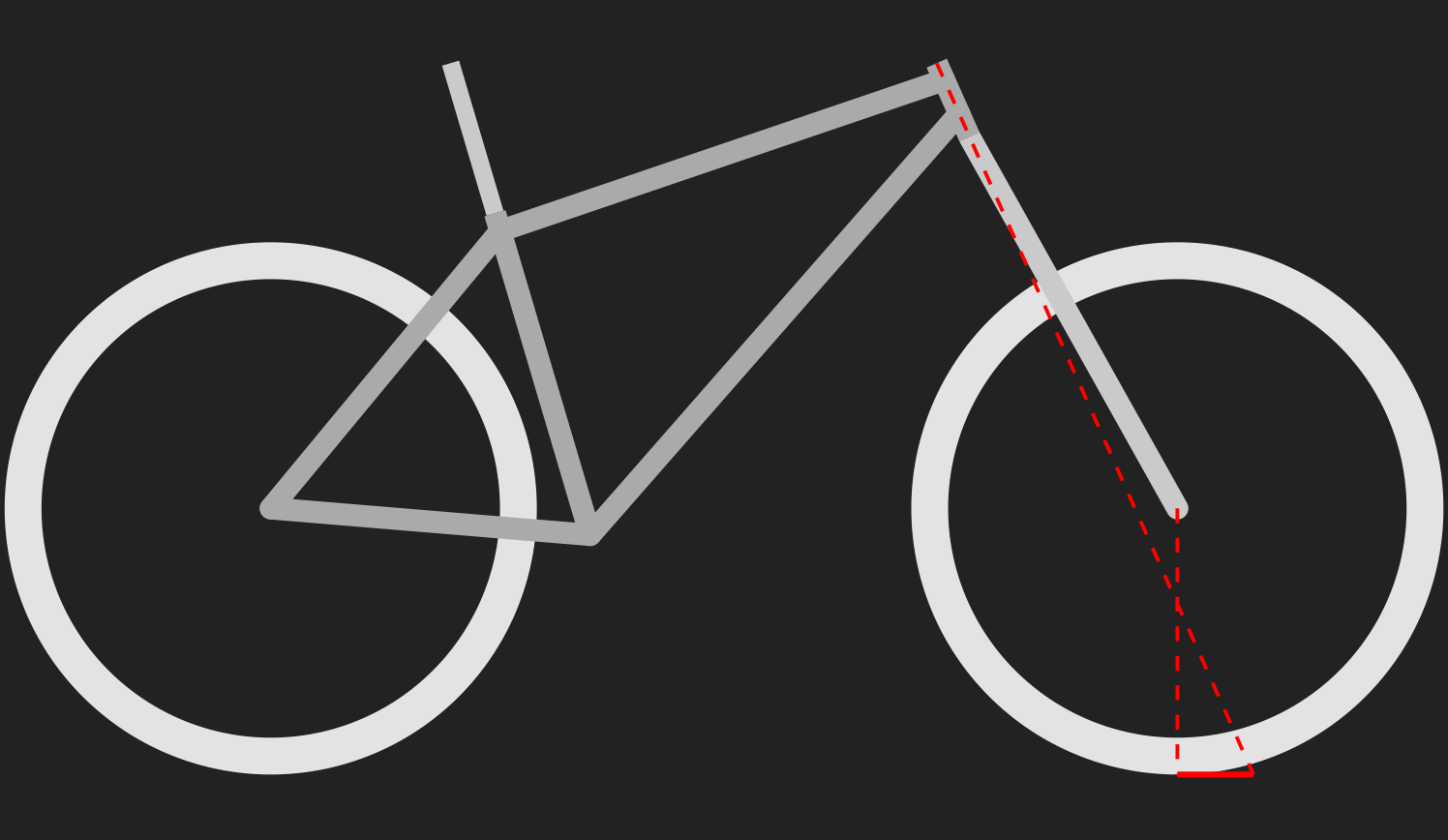
Less fork rake increases trail for slower handling but greater stability. More fork rake decreases trail for faster handling.

Related measurements: Head Tube Angle, Trail

Primarily affects: Steering

Trail

Trail is the horizontal measurement of how far behind the steering axis the front tire makes contact with the ground.



Trail isn't a direct measurement taken from the bike frame, rather it's derived from the head tube angle, fork offset, and wheel size.

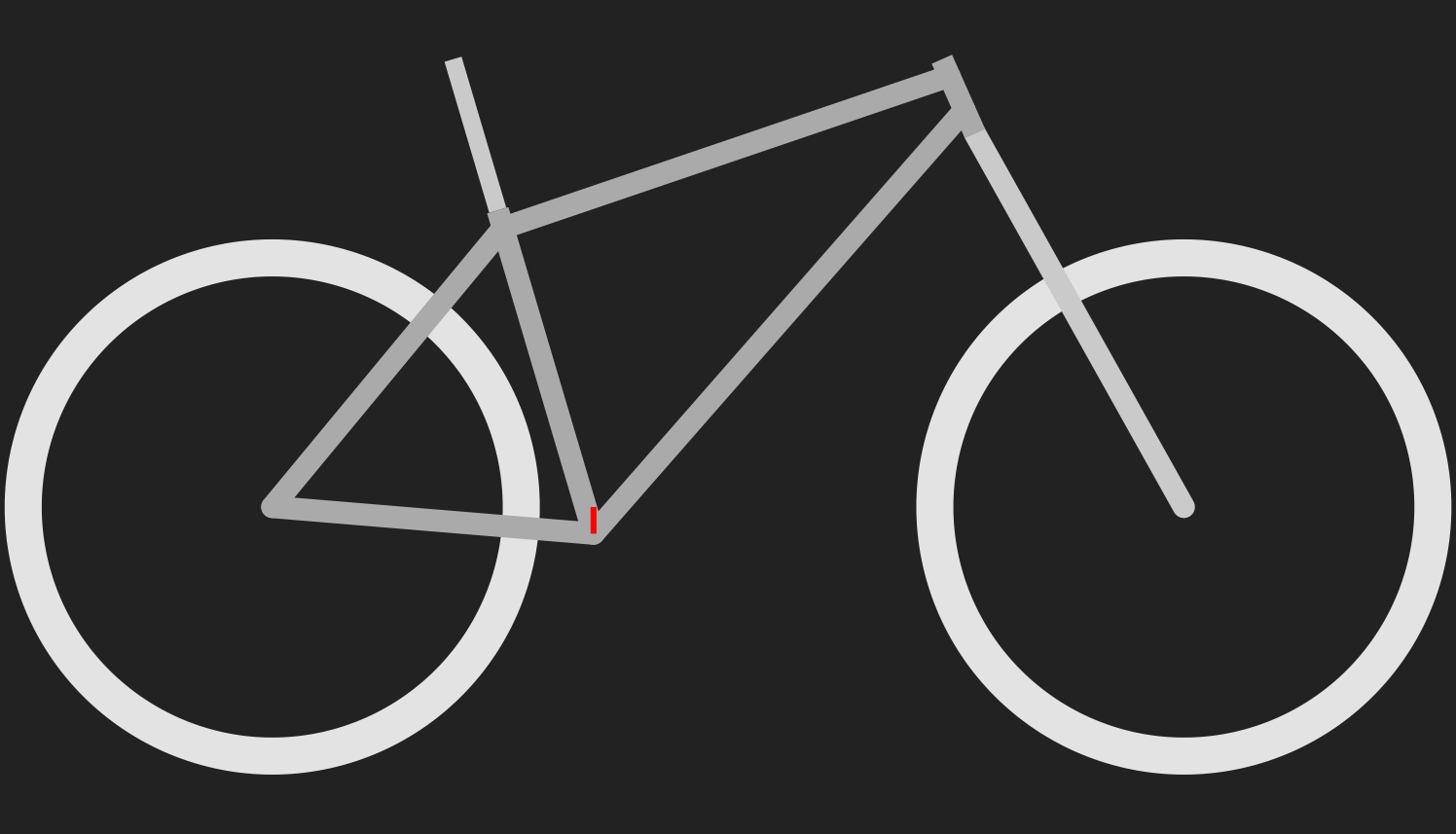
High trail provides more stability at speed and a tendency for steering to self-correct, which is great for rough terrain where holding a line over roots and rocks is important. High-trail bikes tend to respond well to steering with your weight, rather than by turning the handle bars. At low speeds, the front wheel can have a tendency to flop while turning, making it more difficult to make tight turns smoothly.

Low trail provides faster, more agile steering, and improved ability to hold a line through tight corners. This is well-suited to road uses where it's critical to be able to maneuver quickly in a group of riders or around road obstacles. Low-trail bikes are less stable at speed, tending to wandering rather than hold a line.

Related measurements: Head Tube Angle, Fork Rake

Primarily affects: Steering, Cornering

BB Drop



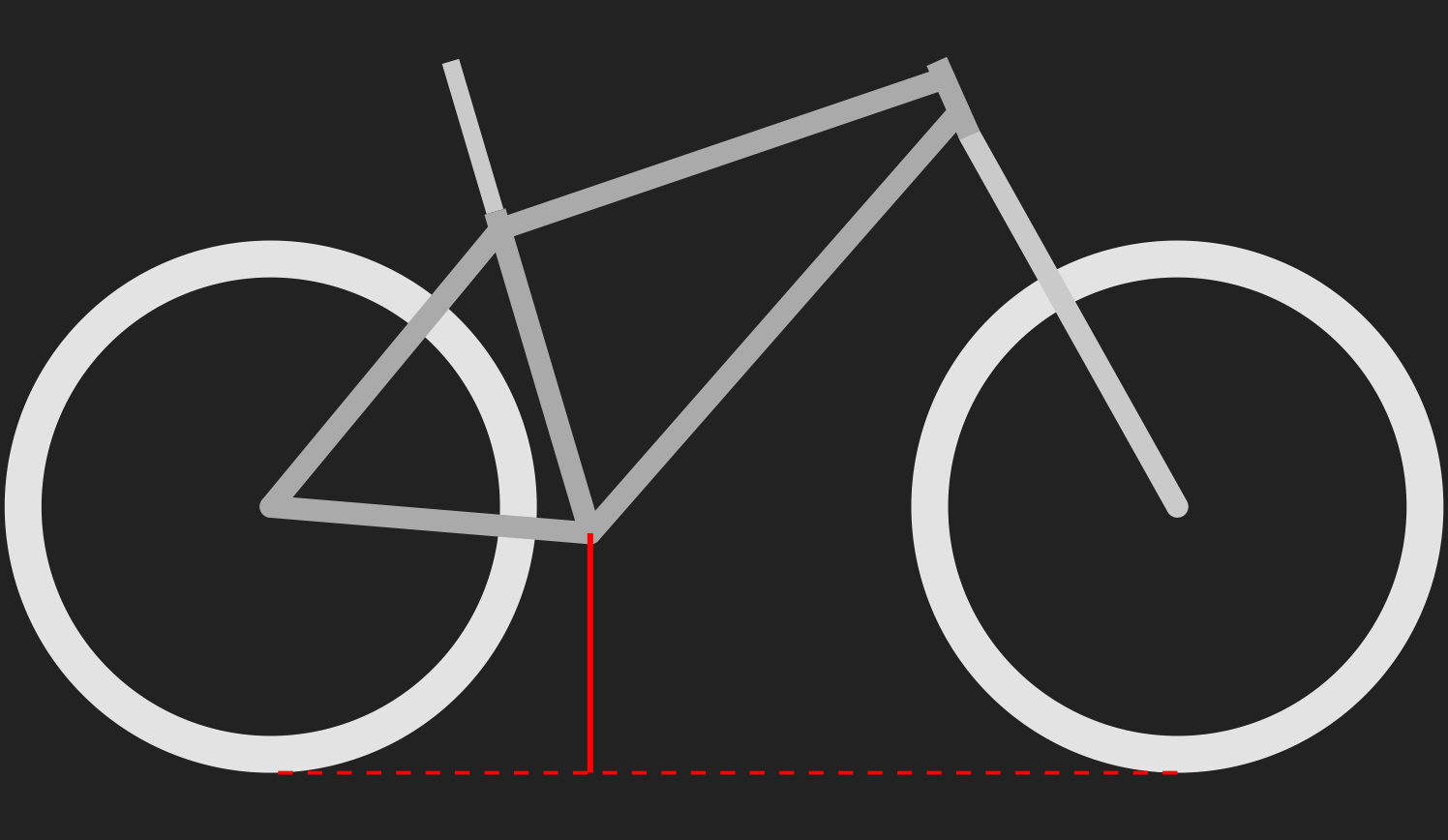
Bottom bracket drop is measured from the center of the bottom bracket to an imaginary horizontal line drawn between the front and rear axles.

BB drop is a compromise between performance and agility. A larger BB drop lowers your center-of-gravity which improves cornering and stability. However, low bottom brackets mean low pedals which can be problematic when mountain biking through technical terrain or trying to pedal through a corner on the road.

Primarily affects: Cornering, ground clearance

Related measurements: BB Height

BB Height



Bottom bracket height is measured from the center of the bottom bracket to the ground.

BB height will vary based on tire selection.

Primarily affects: Cornering, ground clearance

Related measurements: BB Drop

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